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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/309,768	05/11/1999	HIROFUMI SHIMOMURA	134960/98	7947

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EXAMINER
SEDIGHIAN, REZA

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/309,768	SHIMOMURA ET AL.	
	Examiner	Art Unit	
	M. R. Sedighian	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *26 August 2002* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *7* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. This communication is responsive to applicant's 8/26/02 amendments in the application of Shimomura et al. for "Optical Switch and Optical Network" filed 5/11/99. The amendments have been entered. Claims 1-31 are now pending.

2. Claim 23 is objected because the phrase "said second control signal" in line 6, should change to --- said first control circuit ---.

Correction is required.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 7-11, 21-22, and 28-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 7-11 and 29-30, it is not clear about a third and a fourth optical couplers, since a first and a second optical couplers are not claimed.

As to claim 21, it is not clear what is meant by "... a plurality of second optical amplifiers coupled to said second optical couplers ...". Figure 14 shows gate optical amplifiers 161-164 that each has a first and a second optical amplifier according to any one of the first to seventh embodiments. Figure 1 shows the second optical amplifier 12 is connected to a third optical coupler 53 at the input side, and to a fourth coupler 54 at the output side. Therefore, the second optical amplifiers in each optical gates 161 to 164 are not coupled to second optical couplers. In another word, the second optical amplifiers are coupled to the first optical amplifiers

through optical couplers. Furthermore, it is not clear about " ... at least one first optical wavelength multiplexer whose input is connected to each of the output-side branches of some of said plurality of second optical couplers". Figure 14 shows a first optical multiplexer 304 whose input is connected to the output of the second optical amplifiers (not through the second optical couplers, which are located between the first and second amplifiers).

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 5-6, 16, 18, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710)

Regarding claim 1, Sugaya discloses an optical switch (fig. 23) comprising: a first optical amplifier (122, fig. 23); a second optical amplifier (123, fig. 23); and a first control circuit (127, fig. 23) for outputting first and second control signals (col. 18, lines 37-41). Sugaya differs from the claimed invention in that Sugaya does not specifically disclose switching a gain of the first and second amplifiers. Sugaya discloses a control circuit (127, fig. 23) for controlling the light intensity of the excitation light generated by light sources (125, 126, fig. 23) based on a detected optical level (col. 18, lines 37-41). It would have been obvious that a controller such as controller 127 can increase or decrease the intensity of light generated by such light sources and therefore, the gain of respective optical amplifiers corresponding to each light source can be increased or decreased, and accordingly the gain can be switched. Note that "gain switching" in

the present application is defined by pumping or not pumping the light to the respective optical amplifiers 11 and 12, and Sugaya clearly discloses such controllably pumping of light to respective amplifiers 122 and 123. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a controller such as the one of Sugaya for gain switching of respective amplifiers to obtain an equal gain and equal output level for each wavelength to provide an amplification system with a constant optical output level.

Regarding claim 2, Sugaya further discloses semiconductor optical amplifier (col. 20, lines 5-27).

Regarding claim 3, Sugaya further discloses optical fiber amplifier (col. 18, lines 16-27).

Regarding claim 5, Sugaya further discloses a first optical coupler (col. 7, lines 25-28 and 30, fig. 23), and a second optical coupler (30, fig. 23) inserted between the first (122, fig. 23) and second (123, fig. 23) optical amplifier.

Regarding claim 6, Sugaya further discloses an optical power monitor (col. 16, lines 32-41 and 112, 113, fig. 23).

Regarding claim 16, Sugaya further discloses a forward-pumped optical fiber amplifier (col. 7, lines 9-28).

Regarding claim 18, Sugaya further discloses the pumping light generated by wavelength division multiplexing (col. 16, lines 32-58, 64-67, col. 17, lines 1-45 and 114, figs. 20, 22 and 127, fig. 23).

Regarding claims 23, Sugaya further discloses a signal light detector (113, fig. 23) for detecting if the signal light is inputted to the first amplifier (col. 16, lines 32-50) and a control circuit (127, fig. 23). Sugaya further differs from the claimed invention in that Sugaya does not

specifically discloses shutting down the first and second amplifiers. Sugaya discloses a control circuit 127 for controlling the light intensity of the excitation of light sources 125 and 126 based on a detected signal level (col. 18, lines 37-41). Therefore, it would have been obvious to an artisan at the time of invention that a controller such as controller 127 can decrease the intensity of light generated by such light sources to such a low level so that no output light is generated and thereby shutting down the amplification in order to minimize the risk of self-oscillation of the amplifier itself and to provide a safe level output power for light signals to further prevent damages. Furthermore, turning off the fiber amplifier by not exciting the light sources can turn the fiber amplifier into an optical attenuator to further prevent the transmission of light.

Regarding claim 25, Sugaya further discloses a plurality of nodes (50, 20, fig. 12) that are connected through an optical fiber line and having optical line amplifiers (54, 21, fig. 12).

7. Claims 4, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Luo et al. (US Patent No: 6,008,932).

Regarding claims 4 and 12, Sugaya differs from the claimed invention in that Sugaya does not disclose the optical amplifying unit further includes a first, a second, and a third isolator. Luo discloses an optical amplifying section (202, fig. 2) that is comprised of a plurality of optical isolators (210, 218, 226, fig. 2), and a multi-stage EDF amplifiers (212, 224, fig. 2). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical isolators that are connected to optical amplifiers such as the ones of Luo for the optical amplifying unit of Sugaya in order to block the backward scattering of light. Furthermore connecting optical fiber isolators between multiple fiber amplifiers is conventionally known.

Regarding claim 15, Sugaya discloses the first optical amplifier (122, fig. 23) comprises of an erbium-doped optical fiber (col. 18, lines 22-35), and a pumping source (125, fig. 23). Sugaya differs from the claimed invention in that Sugaya does not specifically disclose the pumping source generates a light of 980 nm wavelength. Luo further discloses a pumping source that generates a light of 980 nm wavelength for pumping the doped fiber (col. 4, lines 9-12). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate a pump source of 980 nm wavelength such as the one of Luo for the pump source in the optical amplifying unit of Sugaya in order to provide a better gain behavior and a low noise figure for signals in the low band region to improve the transmission quality and to further provide compatibility with existing amplifier components technology.

8. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Terahara (US Patent No: 6,097,535).

Regarding claims 13-14, Sugaya differs from the claimed invention in that Sugaya does not disclose a first and second filter. Terahara discloses optical amplifiers (32, fig. 6) and optical filters (36, 38, fig. 6) between the optical amplifier (col. 4, lines 21-32). Therefore, it would have been obvious to an artisan at the time of invention to incorporate optical filters that are connected to optical amplifiers such as the ones of Terahara for the optical amplifiers in the optical amplifying unit of Sugaya in order to cancel the wavelength dependence of gain and to reduce deviation in signal-to-noise ratio and deviation in signal power of light signal with respect to wavelength.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Tsuda et al. (US Patent No: 6,038,063).

Regarding claim 17, Sugaya differs from the claimed invention in that Sugaya does not disclose one of the optical amplifiers comprises a bidirectional-pumped optical fiber amplifier. Tsuda discloses a bidirectional-pumped optical fiber amplifier (col. 5, lines 11-21 and 44, 48, 48', fig. 3). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate a bidirectionally pumped optical fiber amplifier such as the one of Tsuda for one of the optical amplifiers in the optical amplifying unit of Sugaya in order to further increase the output power of the signal light and to improve the signal to noise ratio.

10. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugaya (US patent No: 5,812,710) in view of Kinoshita (US Patent No: 6,342,965).

Regarding claims 18-19, Sugaya differs from the claimed invention in that Sugaya does not disclose one of the optical amplifier has a pump light that is generated by a polarization multiplexing, or wavelength division multiplexing. Kinoshita discloses an optical amplifier (61, fig. 6) that has a pump light (63, fig. 6) which is generated by a polarization multiplexing (col. 21, lines 47-50). Therefore, it would have been obvious to a person of ordinary skill in the at the time of invention to incorporate an optical amplifier and a pump light generated by a polarization multiplexing such as the one of Kinoshita for one the optical amplifiers in the optical amplifying unit of Sugaya in order to increase the pump power launched into the fiber and to further reduce unstability of gain due to polarization dependency.

11. Claims 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glance (US patent No: 5,764,821) in view of Sugaya (US patent No: 5,812,710).

Regarding claim 20, Glance discloses an optical switch (col. 2, lines 20-45 and 50, fig. 1) for a wavelength-division multiplexed light (col. 2, lines 48-55 and $F_1F_2F_N$, fig. 1) that is comprised of an optical demultiplexer (33, fig. 1), a plurality of single wavelength optical switches (col. 2, lines 57-67 and 50, fig. 1), and an optical multiplexer (35, fig. 1). Glance differs from the claimed invention in that Glance does not disclose the optical switch comprises of a first and second optical amplifiers and a control circuit. Sugaya discloses an optical amplifying unit (120, fig. 23) that includes a first (121, fig. 23) and a second optical amplifier (122, fig. 23) with a control circuit (127, fig. 23) for outputting first and second control signals (col. 18, lines 16-41). Therefore, it would have been obvious to an artisan at the time of invention to incorporate an optical amplifying unit such as the one of Sugaya for the optical amplifiers in the optical transmission network of Glance in order to increase the pump power launched into the fiber for increasing the signal output power to further increase the transmission distance. As to switching a gain of the first and second amplifiers, Sugaya discloses a control circuit (127, fig. 23) for controlling the light intensity of the excitation light generated by light sources (125, 126, fig. 23) and it would have been obvious that such controller can increase or decrease the intensity of light generated by such light sources and therefore, the gain of respective optical amplifiers can be increased or decreased accordingly to further provide an amplification system with a constant optical output level. The "gain switching" in the present application is defined by pumping or not pumping the light to the respective optical amplifiers and Sugaya clearly discloses such controllably pumping of light to respective amplifiers.

Regarding claim 24, Glance further discloses a plurality of nodes (col. 2, lines 20-34 and 30, fig. 1) that are connected through an optical fiber line (20, fig. 1), and wherein each of the nodes comprises an optical switch (50, fig. 1), as discussed above.

12. Claims 1, 7-11, 21-22, and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka (US patent No: 6,094,296).

Regarding claims 1 and 7, 21-22 as it is understood, Kosaka discloses an optical switch (col. 3, lines 61-64 and 11, 14, 22, fig. 4) for a wavelength-division multiplexed light ($\lambda 1$, $\lambda 2$, $\lambda 3$, fig. 4), comprising: an optical wavelength demultiplexer (18, 20, fig. 4) for demutiplexing the light into a plurality of branches ($\lambda 1$, $\lambda 2$, $\lambda 3$, fig. 4), a plurality of first optical amplifiers (21b, 21c, fig. 4), a plurality of optical couplers connected to the outputs of the first optical amplifiers (23b, 23c, fig. 4), an optical wavelength multiplexer (19, fig. 4), a second optical amplifier (10, fig. 4), and a control circuit (14, fig. 4) for outputting first and second control signals (col. 6, lines 11-27). Kosaka differs from the claimed invention in that Kosaka does not specifically disclose switching a gain of the first and second amplifiers. Kosaka discloses a control circuit 14 for controlling the light intensity of the excitation light generated by light sources 11, 22b, and 22c (col. 6, lines 24-26). Kosaka further discloses proving negative gain when less amount of power is supplied to the fiber amplifier and positive gain when a larger amount of excitation power is supplied (col. 7, lines 54-67). Therefore, it would have been obvious to a person of ordinary skill in the art to incorporate a controller such as the one of Kosaka for switching gain of respective amplifiers to obtain an equal gain and equal output level for each wavelength to provide an amplification system with a constant optical output level.

The "gain switching" in the present application is defined by pumping or not pumping the light to the respective optical amplifiers 11 and 12, and Kosaka clearly discloses such controllably pumping of light to respective amplifiers such as amplifiers 10 and 21b. Kosaka further differs from the claimed invention in that Kosaka does not disclose a plurality of first optical couplers connected to each of the plurality of branches. Kosaka discloses optical filters (20a, 20b, 20c, fig. 4) that are connected to each respective optical line amplifying units (17a, 17b, 17c, fig. 4), and therefore, optical couplers can be provided to couple the filters to the amplifying units. Kosaka further discloses optical couplers (33, 35, fig. 10) that are used to branch (col. 13, lines 7-16) part of the input and output signals for further monitoring (34, 36, fig. 10) and control (14, fig. 10). Furthermore, incorporating optical couplers along the transmission fiber lines for branching or coupling or combining of different light signals is well known in the field of optical communication. Therefore, it would have been to a person of ordinary skill in the at the time of invention to incorporate a plurality of optical couplers for the respective branch lines in the optical demultiplexing and amplification units of Kosaka in order to partially split a portion of the input light signal for further signal monitoring and signal processing. As to claim 7, Kosaka discloses a first (21b, fig. 4), a second (10, fig. 4), a third optical amplifier (21c, fig. 4), a first control circuit (14, fig. 4), an optical coupler (19, fig. 4) between the first (21b, fig. 4) and the second amplifier (10, fig. 4). Claim 7 further requires similar limitations as discussed above.

As to claim 8, Kosaka discloses a semiconductor optical amplifier (col. 5, lines 50-51).

As to claim 9, Kosaka discloses an optical fiber amplifier (col. 5, lines 19-20).

As to claim 10, Kosaka discloses another optical coupler (18, fig. 4) that is connected to the input of the first optical amplifier (17b, 21b, fig. 4).

As to claim 11, Kosaka discloses an optical power monitor (34, fig. 10) for detecting the optical power outputted from the second optical amplifier (col. 13, lines 7-9).

As to claims 26-28, Kosaka differs from the claimed invention in that Kosaka does not specifically disclose first optical amplifier switches the route of light. Kosaka discloses a control unit 14 that control the amount of excitation of light source 22b and further discloses a medium 21b for attenuating light if a small amount of excitation power, or no excitation power is flowing thereinto (col. 7, lines 54-58). Accordingly if the light signal is attenuated (for example by fiber 21b) the light can pass through one of the other routes (for example through unit 17c). Therefore, it would have been obvious to an artisan at the time of invention to incorporate an optical amplifier and control circuitry such as the one of Kosaka to switch the route of light signals to provide an amplification system that can respond to changes in input or output conditions, or operating conditions such as link loss, pump deterioration, network configuration, and gain requirements.

As to claims 29-31, Kosaka discloses an optical coupler (19, fig. 4) is inserted between the first (21b, fig. 4) and the second amplifier (10, fig. 4), and a third optical amplifier (21c, fig. 4) with an output that is connected to the input of the coupler (19, fig. 4).

13. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. R. Sedighian whose telephone number is (703) 308-9063. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

Leslie Pascal

LESLIE PASCAL
PRIMARY EXAMINER